**Claims**

What is claimed is:

1. An optical sensing device, comprising:

a fiber having a side surface on fiber cladding within an evanescent field of guided light in the fiber;

a metal layer formed on the side surface and having a thickness to transmit the evanescent field;

an optical detector to receive guided light in the fiber passing through the side surface and to produce a detector output; and

a processing circuit to measure an optical loss of the guided light at the side surface from the detector output and operable to extract a property of the medium above the metal layer from the measured optical loss.

2. The device as in claim 1, wherein the processing circuit compares the measured optical loss to calibrated optical losses for different materials and identifies one material from the different materials as being present in the medium above the metal layer when the measured optical loss corresponds to a calibrated optical loss for the one material.

3. The device as in claim 1, wherein the processing circuit measures a duration of the measured optical loss of the identified one material and uses the measured duration to determine a percentage of the identified one material in the medium above the metal layer.

4. The device as in claim 1, further comprising a protective layer over the metal layer.

5. The device as in claim 1, wherein the optical detector receives light at a first wavelength in the guided light to produce a first detector output, and the device further comprising:

a second optical detector to receive light at a second, different wavelength in the guided light to produce a second detector output,

wherein the processing circuit uses a ratio of the first and the second detector outputs to determine the measured optical loss at the side surface.

6. The device as in claim 5, further comprising first and second optical filters to produce the light at the first wavelength and the light at the second wavelength, respectively.

7. The device as in claim 1, wherein the processing circuit operates to use a duration of a measured optical loss to determine a percentage of a material component in the medium above the metal layer.

8. An optical sensing device, comprising:

a first sensor comprising (1) a first fiber having a first side surface on fiber cladding within an evanescent field of guided light in the first fiber, and (2) a first metal layer formed on the first side surface and having a first thickness to transmit a maximum amount of the evanescent field when a first material present above the first metal layer;

a first optical detector to receive guided light in the first fiber passing through the first side surface and to produce a first detector output;

a second sensor comprising a second fiber having a first side surface on fiber cladding within an evanescent field of guided light in the second fiber;

a second optical detector to receive guided light in the second fiber passing through the second side surface and to produce a second detector output; and

a processing circuit coupled to receive the first and the second detector outputs and measure optical losses at the first and the second side surfaces from the first and the second

detector outputs, respectively, the processing circuit operable to determine presence of the first material from the measured optical loss in the first detector output and presence of a second material that changes an optical loss at the second side surface when present above the second side surface.

9. The device as in claim 8, wherein the processing circuit is operable to compare the measured optical loss from the first detector output to a calibrated optical loss measurement for the first material in determination of the presence of the first material at the first side surface.

10. The device as in claim 9, wherein the processing circuit measures a duration of a measured optical loss in each of the first and the second detector outputs and uses the measured duration to determine a percentage of a corresponding material in the medium measured by the first and second sensors.

11. The device as in claim 9, wherein the second sensor further comprises a second metal layer formed on the second side surface and having a second thickness to transmit a maximum amount of the evanescent field when the second material present above the second metal layer.

12. A method for using a fiber sensor to measure material components in a material mixture, wherein the fiber sensor comprises a fiber with a side surface on fiber cladding within an evanescent field of guided light in the fiber, and a metal layer formed on the side surface and having a thickness to transmit the evanescent field, the method comprising:

contacting the fiber sensor with the material mixture under measurement so that the material mixture is present at the metal layer;

directing a probing light beam at a probing wavelength into the fiber to allow for a fraction of the probing light beam to be coupled out of the side surface through the metal layer;

measuring an optical loss of the probing light beam output from the fiber; and

using the measured optical loss to determine at least whether a selected material component is present in the material mixture.

13. The method as in claim 12, further comprising comparing the measured optical loss to a calibrated optical loss measurement for the selected material obtained at the same probing wavelength in making the determination.

14. The method as in claim 12, further comprising comparing the measured optical loss to a calibrated optical loss measurement for a second selected material obtained at the same probing wavelength to determine whether the second selected material is present in the material mixture.

15. The method as in claim 12, further comprising measuring a duration of the measured optical loss for the selected material to determine a percentage of the selected material present in the material mixture.

16. The method as in claim 12, wherein the selected material is a gas.

17. The method as in claim 12, wherein the selected material is water.

18. The method as in claim 12, wherein the selected material is an oil.

19. The method as in claim 12, wherein the selected material is a liquid.

20. The method as in claim 12, further comprising:

splitting the probing light beam output from the fiber into a first beam at a first wavelength and a second beam at a second, different wavelength,

wherein the measurement of the optical loss includes:

measuring an optical power level of the first beam,

measuring an optical power level of the second beam,

obtaining a ratio of optical power levels of the first and the second beams, and

using the ratio to determine the measured optical loss.